

FCC CERTIFICATION
On Behalf of
The Sharper Image

Wireless Stereo Speaker System Transmitter
Model No.: SI494

FCC ID: MNISI494

Prepared for : The Sharper Image
Address : 650 Davis Street, San Francisco, CA94111, U.S.A
Prepared by : ACCURATE TECHNOLOGY CO. LTD
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Report Number : ATE2005639
Date of Test : April 27-29, 2005
Date of Report : May 12, 2005

TABLE OF CONTENTS

Description	Page
Test Report Certification	
1. GENERAL INFORMATION	4
1.1. Description of Device (EUT).....	4
1.2. Description of Test Facility	4
1.3. Measurement Uncertainty	4
2. MEASURING DEVICE AND TEST EQUIPMENT	5
3. FUNDAMENTAL AND HARMONICS RADIATED EMISSION MEASUREMENT	6
3.1. Block Diagram of Test Setup.....	6
3.2. The Emission Limit	6
3.3. Configuration of EUT on Measurement	7
3.4. Operating Condition of EUT	7
3.5. Test Procedure	7
3.6. The Field Strength of Radiation Emission Measurement Results	8
4. RADIATED EMISSION FOR FCC PART 15 SECTION 15.249(D).....	9
4.1. Block Diagram of Test Setup.....	9
4.2. The Emission Limit For Section 15.249(d)	9
4.3. EUT Configuration on Measurement	11
4.4. Operating Condition of EUT	11
4.5. Test Procedure	11
4.6. The Emission Measurement Result	12
5. BAND EDGES FOR FCC PART 15 SECTION 15.249(D).....	13
5.1. The Requirement For Section 15.249(d)	13
5.2. EUT Configuration on Measurement	13
5.3. Operating Condition of EUT	13
5.4. Test Procedure	13
5.5. The Measurement Result	14
6. CONDUCTED EMISSION FOR FCC PART 15 SECTION 15.207(A)	15
6.1. Block Diagram of Test Setup.....	15
6.2. The Emission Limit For Section 15.207(a)	15
6.3. EUT Configuration on Measurement	16
6.4. Operating Condition of EUT	16
6.5. Test Procedure	16
6.6. Power Line Conducted Emission Measurement Results	17
7. ANTENNA REQUIREMENT.....	18
7.1. The Requirement	18
7.2. Antenna Construction	18
APPENDIX I (TEST CURVES) (8pages)	

Test Report Certification

Applicant : The Sharper Image
 Manufacturer : Mei Hua Electronics Factory
 EUT Description : Wireless Stereo Speaker System Transmitter
 (A) MODEL NO.: SI494
 (B) SERIAL NO.: N/A
 (C) POWER SUPPLY: 12Vd.c. with adapter

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.249, Section 15.207:2004
 & ANSI C63.4: 2003


The device described above is tested by ACCURATE TECHNOLOGY CO. LTD to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section 15.249, Section 15.207 limits. The measurement results are contained in this test report and ACCURATE TECHNOLOGY CO. LTD is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of ACCURATE TECHNOLOGY CO. LTD.

Date of Test : April 27-29, 2005

Prepared by : 
 (Engineer)

Reviewer : 
 (Quality Manager)

Approved & Authorized Signer : 
 (Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT : Wireless Stereo Speaker System Transmitter

Model Number : SI494

Power Supply : 12Vd.c. with adapter
The AC/DC Adapter used for test:
Model No.: DPX481820;
Input: 120Va.c. 60Hz 20W;
Output: 12Vd.c. 600Ma
UL Listed 73Z5 E108373; CSA LR81343

Applicant : The Sharper Image

Address : 650 Davis Street, San Francisco, CA94111, U.S.A

Manufacturer : Mei Hua Electronics Factory

Address : Kwan Chen Tow Village, Industrial Zone, Fung Gang,
Dong Guan City, Guangdong, P.R.China

Date of sample received : April 25, 2005

Date of Test : April 27-29, 2005

1.2. Description of Test Facility

EMC Lab : Accredited by TUV Rheinland Shenzhen, May 10, 2004

Accredited by FCC, May 10, 2004
The Certificate Registration Number is 253065

Accredited by Industry Canada, May 18, 2004
The Certificate Registration Number is IC 5077

Name of Firm : ACCURATE TECHNOLOGY CO. LTD

Site Location : F1, Bldg. A, Changyuan New Material Port, Keyuan Rd.
Science & Industry Park, Nanshan, Shenzhen, Guangdong
P.R. China

1.3. Measurement Uncertainty

Conducted Emission Uncertainty = $\pm 2.66\text{dB}$

Radiated Emission Uncertainty = $\pm 4.26\text{dB}$

2. MEASURING DEVICE AND TEST EQUIPMENT

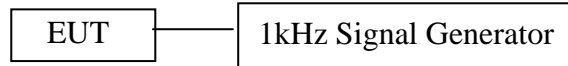
Table 1: List of Test and Measurement Equipment

Kind of equipment	Manufacturer	Type	S/N	Calibrated until
EMI Test Receiver	Rohde&Schwarz	ESI26	838786/013	01.02.2006
Bilog Antenna	Chase	CBL6112B	2591	01.02.2006
Horn Antenna	Rohde&Schwarz	HF906	100013	01.02.2006
Spectrum Analyzer	Anritsu	MS2651B	6200238856	01.02.2006
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	01.02.2006
L.I.S.N.	Rohde&Schwarz	ESH3-Z5	100305	01.02.2006
L.I.S.N.	Rohde&Schwarz	ESH3-Z5	100310	01.02.2006
Signal Generator	GW	GAG-810	0913317	01.02.2006

3. FUNDAMENTAL AND HARMONICS RADIATED EMISSION MEASUREMENT

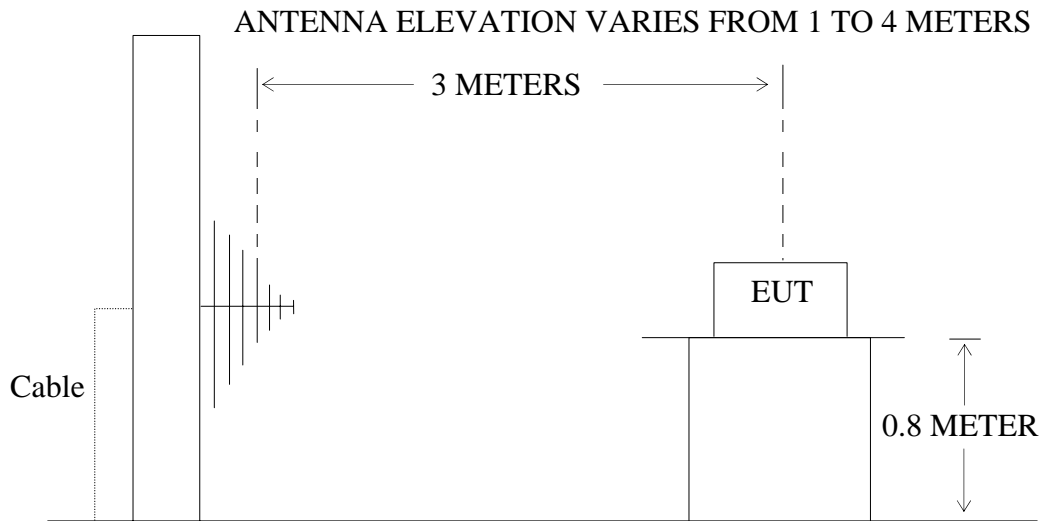
3.1. Block Diagram of Test Setup

3.1.1. Block diagram of connection between the EUT and simulators



(EUT: Wireless Stereo Speaker System Transmitter)

3.1.2. Anechoic Chamber Test Setup Diagram



(EUT: Wireless Stereo Speaker System Transmitter)

3.2. The Emission Limit

- 3.2.1 For intentional radiators, According to section 15.249(a), Operation within the frequency band of 2.4 to 2.4835GHz, The fundamental field strength shall not exceed 94 dB μ V/m and the harmonics shall not exceed 54 dB μ V/m.

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Fundamental (microvolts/meter)
902-928MHz	50	500
2400-2483.5MHz	50	500
5725-5875MHz	50	500
24.0-24.25GHz	250	2500

- 3.2.2 According to section 15.249(e), as shown in section 15.35(b), The peak field strength

of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

3.3. Configuration of EUT on Measurement

The following equipment are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

3.3.1. Wireless Stereo Speaker System Transmitter (EUT)

Model Number : SI494
Serial Number : N/A
Manufacturer : Mei Hua Electronics Factory

3.4. Operating Condition of EUT

3.4.1. Setup the EUT and simulator as shown as Section 3.1.

3.4.2. Turn on the power of all equipment.

3.4.3. Let the EUT work in TX modes (On with 1kHz Signal) measure it.

3.5. Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4: 2003 on radiated emission measurement.

The bandwidth of test receiver (R&S ESI26) is set at 1MHz.

3.6. The Field Strength of Radiation Emission Measurement Results

PASS.

Date of Test:	<u>April 27-29, 2005</u>	Temperature:	<u>22°C</u>
	<u>Wireless Stereo Speaker System</u>		
EUT:	<u>Transmitter</u>	Humidity:	<u>50%</u>
Model No.:	<u>SI494</u>	Power Supply:	<u>120V a.c./60Hz</u>
Test Mode:	<u>TX with 1kHz signal</u>	Test Engineer:	<u>Jack</u>

Fundamental and Harmonics Radiated Emissions

Frequency (MHz)	Reading(dBμV/m)		Factor(dB) Corr.	Result(dBμV/m)		Limit(dBμV/m)		Margin(dBμV/m)		Polarization
	AV	PEAK		AV	PEAK	AV	PEAK	AV	PEAK	
2409.949	58.4	60.5	27.5	85.9	88.0	94	114	8.1	26.0	Vertical
2409.949	58.8	60.8	27.5	86.3	88.3	94	114	7.7	25.7	Horizontal
4819.898	47.9	49.9	2.8	50.7	52.7	54	74	3.3	21.3	Vertical
4819.898	48.6	50.6	2.8	51.4	53.4	54	74	2.6	20.6	Horizontal
7229.847	44.6	46.6	5.9	50.5	52.5	54	74	3.5	21.5	Vertical
7229.847	45.2	47.2	5.9	51.1	53.1	54	74	2.9	20.9	Horizontal
9639.796	38.7	40.7	7.2	45.9	47.9	54	74	8.1	26.1	Vertical
9639.796	41.3	43.3	7.2	48.5	50.5	54	74	5.5	23.5	Horizontal
12049.745	-	-	9.3	-	-	-	-	-	-	-
14459.694	-	-	11.8	-	-	-	-	-	-	-
16869.643	-	-	12.3	-	-	-	-	-	-	-
19279.592	-	-	9.1	-	-	-	-	-	-	-
21689.541	-	-	10.2	-	-	-	-	-	-	-
24099.490	-	-	11.4	-	-	-	-	-	-	-

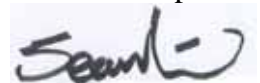
Note:

1. Remark “-” means that the emission level is too low to be measured.
2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

Where Corrected Factor = Antenna Factor + Cable Loss + High Pass Filter Loss – Amplifier Gain

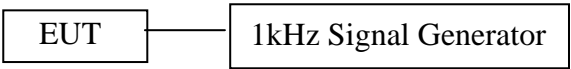
Reviewer :



4. RADIATED EMISSION FOR FCC PART 15 SECTION 15.249(D)

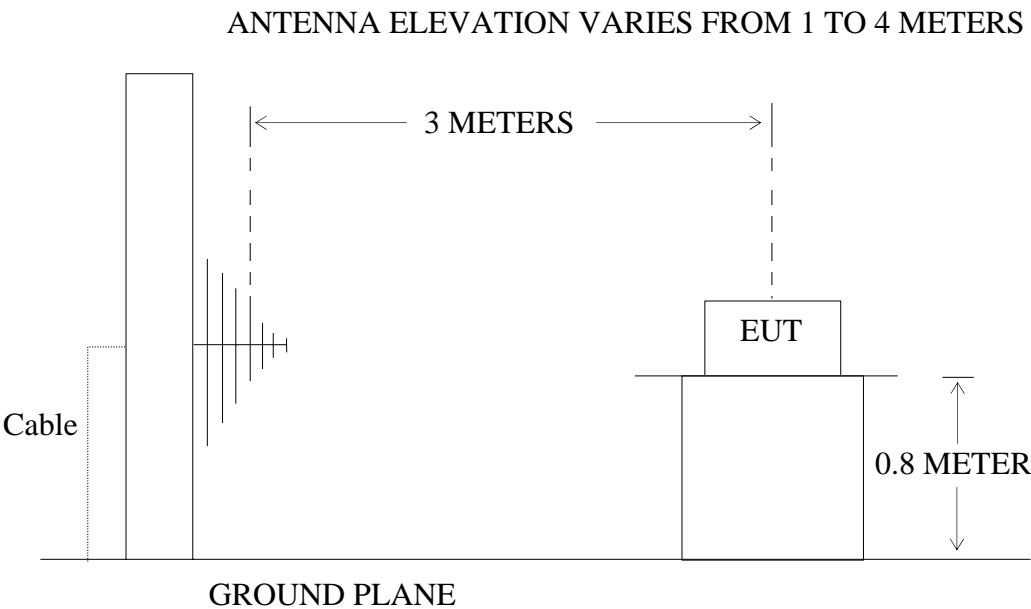
4.1. Block Diagram of Test Setup

4.1.1. Block diagram of connection between the EUT and simulators



(EUT: Wireless Stereo Speaker System Transmitter)

4.1.2. Anechoic Chamber Test Setup Diagram



(EUT: Wireless Stereo Speaker System Transmitter)

4.2. The Emission Limit For Section 15.249(d)

4.2.1 Emission radiated outside of the specified frequency bands, except for harmonics, shall be comply with the general radiated emission limits in Section 15.209.

Radiation Emission Measurement Limits According to Section 15.209

Frequency (MHz)	Limit,		
	Field Strength of Quasi-peak Value (microvolts/m)	Field Strength of Quasi-peak Value (dBμV/m)	The final measurement in band 9-90kHz, 110-490kHz and above 1000MHz is performed with
30 - 88	100	40	

88 - 216	150	43.5	Average detector. Except those frequency bands mention above, the final measurement for frequencies below 1000MHz is performed with Quasi Peak detector.
216 - 960	200	46	
Above 960	500	54	

4.3.EUT Configuration on Measurement

The following equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

4.3.1. Wireless Stereo Speaker System Transmitter (EUT)

Model Number : SI494
 Serial Number : N/A
 Manufacturer : Mei Hua Electronics Factory

4.4.Operating Condition of EUT

4.4.1. Setup the EUT and simulator as shown as Section 4.1.

4.4.2. Turn on the power of all equipment.

4.4.3. Let the EUT work in TX modes (On with 1kHz Signal) measure it.

4.5.Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4: 2003 on radiated emission measurement.

The bandwidth of test receiver (R&S ESI26) is set at 120KHz in 30-1000MHz. and set at 1MHz in above 1000MHz.

The frequency range from 30MHz to 1000MHz is checked.

The final measurement in band 9-90kHz, 110-490kHz and above 1000MHz is performed with Average detector. Except those frequency bands mention above, the final measurement for frequencies below 1000MHz is performed with Quasi Peak detector.

4.6. The Emission Measurement Result

PASS.

Date of Test:	<u>April 27-29, 2005</u>	Temperature:	<u>22°C</u>
	<u>Wireless Stereo Speaker System</u>		
EUT:	<u>Transmitter</u>	Humidity:	<u>50%</u>
Model No.:	<u>SI494</u>	Power Supply:	<u>120V a.c./60Hz</u>
Test Mode:	<u>TX with 1kHz signal</u>	Test Engineer:	<u>Jack</u>

Frequency (MHz)	Reading(dBμV/m)		Factor(dB) Corr.	Result(dBμV/m)		Limit(dBμV/m)		Margin(dBμV/m)		Polarization
	AV	QP		AV	QP	AV	QP	AV	QP	
-	-	-	-	-	-	-	-	-	-	Vertical
-	-	-	-	-	-	-	-	-	-	Horizontal


Note:

1. Remark “- “ means that the emission level is too low to be measured.
2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

$$\text{Result} = \text{Reading} + \text{Corrected Factor}$$

Where Corrected Factor = Antenna Factor + Cable Loss + High Pass Filter Loss – Amplifier Gain
3. All the scanning waveforms are attached in Appendix I.

Reviewer :



5. BAND EDGES FOR FCC PART 15 SECTION 15.249(D)

5.1. The Requirement For Section 15.249(d)

- 5.1.1. According to Section 15.249(d), out band emission except for harmonics shall be at least attenuated by 50 dB below the level of the fundamental.

5.2. EUT Configuration on Measurement

The following equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

5.2.1. Wireless Stereo Speaker System Transmitter (EUT)

Model Number : SI494
Serial Number : N/A
Manufacturer : Mei Hua Electronics Factory

5.3. Operating Condition of EUT

- 5.3.1. Setup the EUT and simulator as shown as Section 4.1.
- 5.3.2. Turn on the power of all equipment.
- 5.3.3. Let the EUT work in TX modes (On with 1kHz Signal) measure it.

5.4. Test Procedure


- 5.4.1. Measure the fundamental amplitude appearing on spectral display and set it as a reference level. measure the lower band edge amplitude. Get the delta amplitude and edge frequency.
- 5.4.2. Repeat above procedures , Measure the fundamental amplitude appearing on spectral display and set it as a reference level. measure the upper band edge amplitude. Get the delta amplitude and edge frequency.

5.5. The Measurement Result

Pass

- 5.5.1 Lower band edge: Emission radiated outside of the lower band edge are 62.85 dB below the level of the fundamental.
- 5.5.2 Upper band edge: Emission radiated outside of the upper band edge are 61.52 dB below the level of the fundamental.
- 5.5.3 All the spectral waveforms are attached in Appendix I.

Reviewer :

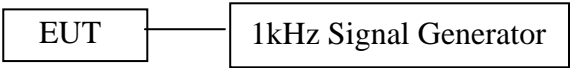
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6. CONDUCTED EMISSION FOR FCC PART 15 SECTION

15.207(A)

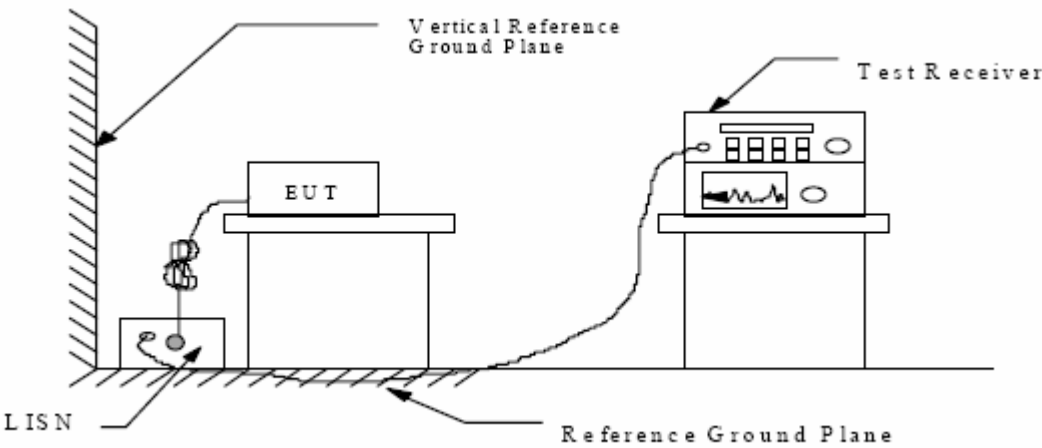
6.1. Block Diagram of Test Setup

6.1.1. Block diagram of connection between the EUT and simulators



(EUT: Wireless Stereo Speaker System Transmitter)

6.1.2. Shielding Room Test Setup Diagram



(EUT: Wireless Stereo Speaker System Transmitter)

6.2. The Emission Limit For Section 15.207(a)

6.2.1 Radiation Emission Measurement Limits According to Section 15.207(a)

Frequency (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 - 5	56	46
5 - 30	60	50

* Decreases with the logarithm of the frequency.

6.3.EUT Configuration on Measurement

The following equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

6.3.1. Wireless Stereo Speaker System Transmitter (EUT)

Model Number : SI494
Serial Number : N/A
Manufacturer : Mei Hua Electronics Factory

6.4.Operating Condition of EUT

6.4.1. Setup the EUT and simulator as shown as Section 6.1.

6.4.2. Turn on the power of all equipment.

6.4.3. Let the EUT work in TX modes (On with 1kHz Signal) measure it.

6.5.Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.4: 2003 on Conducted Emission Measurement.

The bandwidth of test receiver (R & S ESCS30) is set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

All the scanning waveforms are attached in Appendix I.

6.6. Power Line Conducted Emission Measurement Results

PASS.

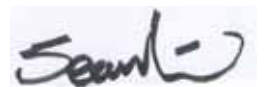
The frequency range from 150kHz to 30MHz is checked.

Date of Test:	<u>April 27-29, 2005</u>	Temperature:	<u>22°C</u>
	<u>Wireless Stereo Speaker System</u>		
EUT:	<u>Transmitter</u>	Humidity:	<u>50%</u>
Model No.:	<u>SI494</u>	Power Supply:	<u>120V a.c./60Hz</u>
Test Mode:	<u>TX with 1kHz signal</u>	Test Engineer:	<u>Andy</u>

Test Line	Frequency MHz	Emission Level(dBμV)		Limits(dBμV)		Margin(dBμV)	
		QP	AV	QP	AV	QP	AV
Va	0.150	41.3	15.7	66.0	56.0	24.7	40.3
Va	0.330	40.7	15.1	59.45	49.45	18.75	34.35
Va	0.345	40.2	15.0	59.08	49.08	18.88	34.08
Va	0.370	39.4	14.5	58.50	48.50	19.1	34
Va	0.380	39.1	14.2	58.28	48.28	19.18	34.08
Vb	0.150	40.4	15.1	66.0	56.0	25.6	40.9
Vb	0.310	39.0	14.2	59.97	49.97	20.97	35.77
Vb	0.340	38.0	13.7	59.20	49.20	21.2	35.5
Vb	0.365	36.7	13.1	58.61	48.61	21.91	35.51
Vb	0.385	35.7	13.0	58.17	48.17	22.47	35.17

The spectral diagrams in appendix I display the measurement of un-weighted peak values.

Reviewer :



7. ANTENNA REQUIREMENT

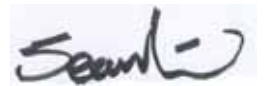
7.1. The Requirement

- 7.1.1. According to Section 15.203, An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

7.2. Antenna Construction

The antenna is mount on the TX PCB, no consideration of replacement.

Reviewer :

A handwritten signature in black ink, appearing to read "Sean", is placed over a light blue rectangular background. The signature is written in a cursive, stylized font.

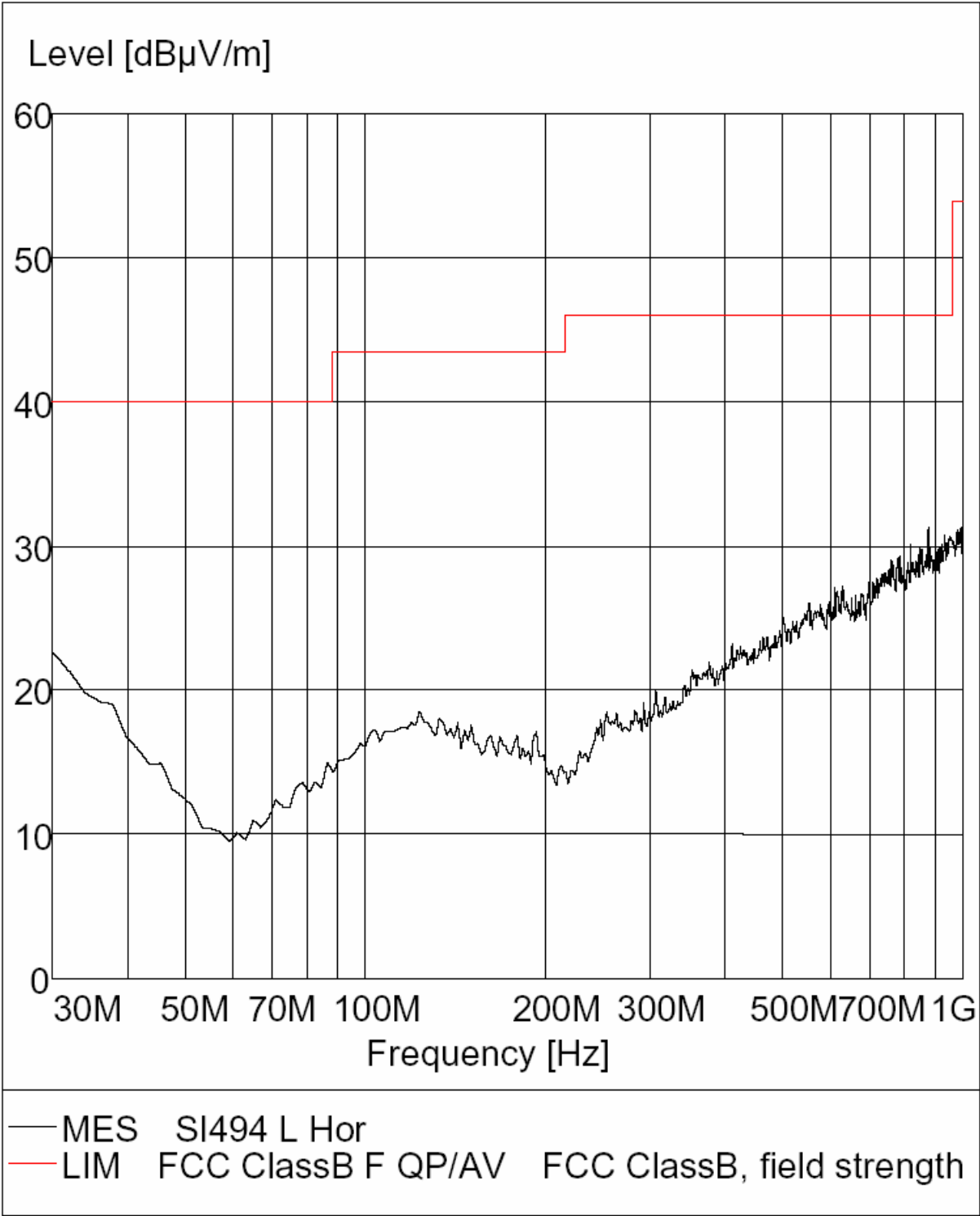
APPENDIX I (Test Curves)

Radiated Disturbance

FCC Part15

EUT: Wireless stereo speaker system transmitter
Manufacturer: Mei Hua
Operating Condition: TX
Test Site: ATC EMC Lab.SAC
Operator: Jack
Test Specification: Horizontal
Comment: AC 120V/60Hz

M/N:SI494

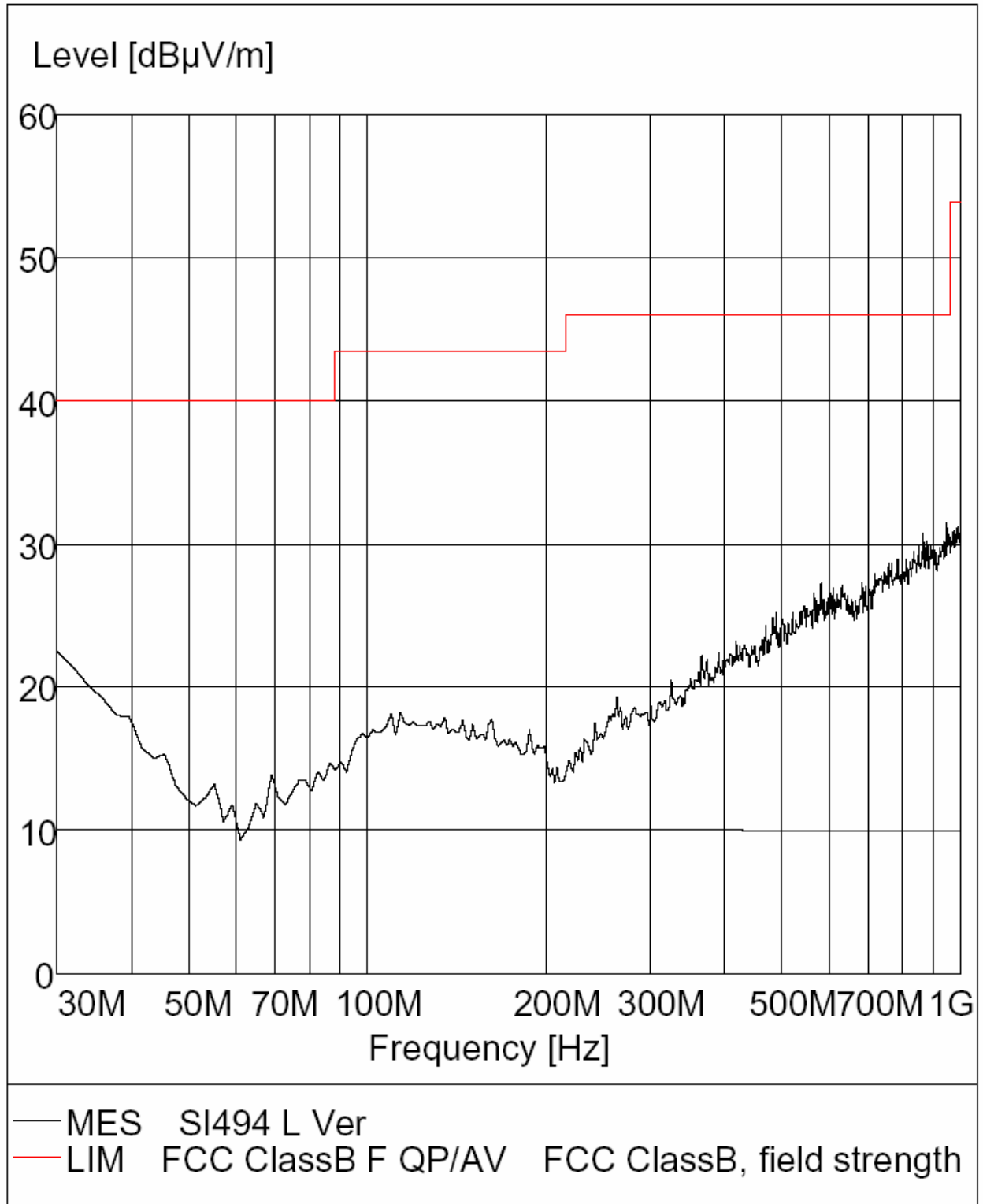


Radiated Disturbance

FCC Part15

EUT: Wireless stereo speaker system transmitter
 Manufacturer: Mei Hua
 Operating Condition: TX
 Test Site: ATC EMC Lab.SAC
 Operator: Jack
 Test Specification: Vertical
 Comment: AC 120V/60Hz

M/N:SI494

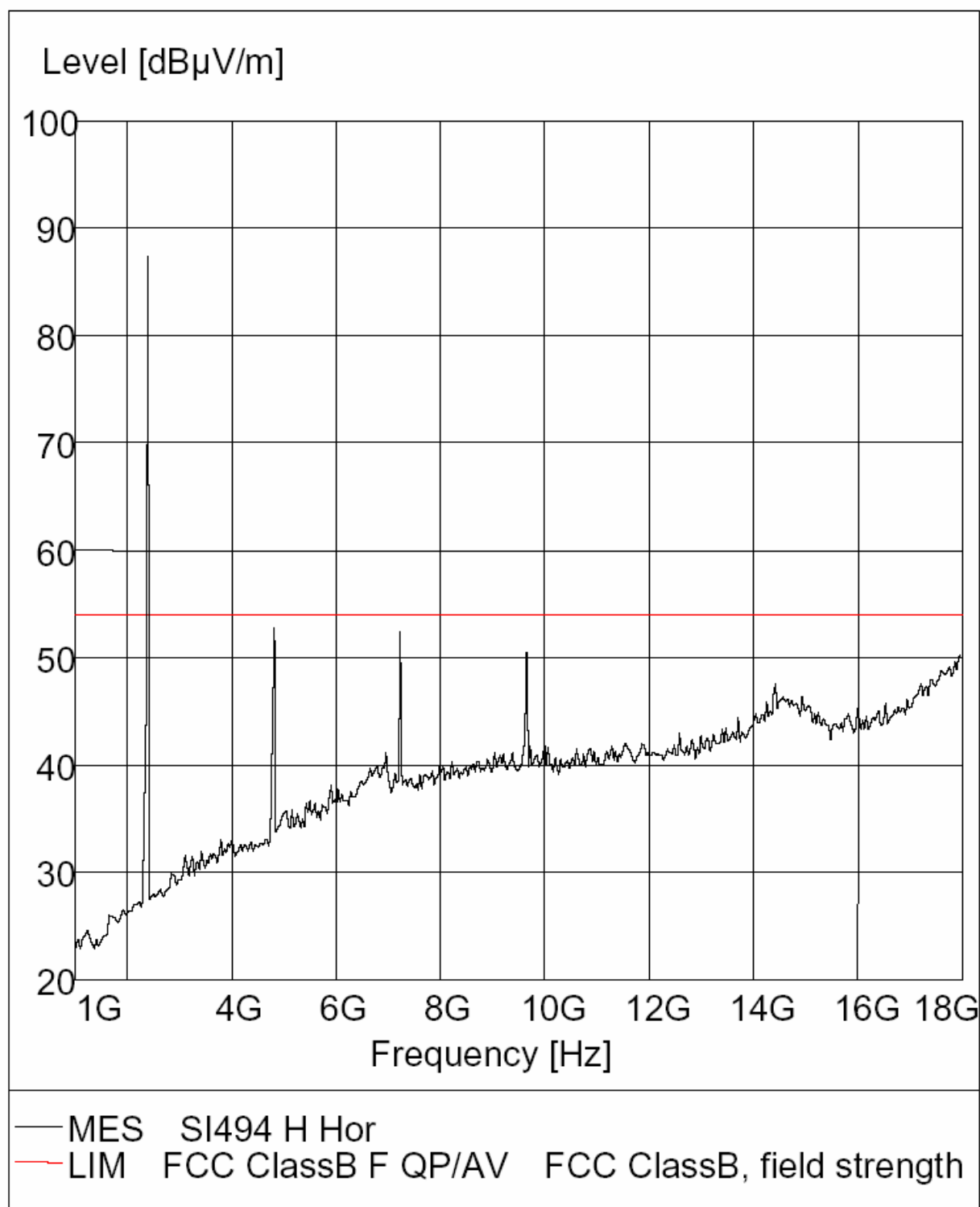


Radiated Disturbance

FCC Part15

EUT: Wireless stereo speaker system transmitter
 Manufacturer: Mei Hua
 Operating Condition: TX
 Test Site: ATC EMC Lab.SAC
 Operator: Jack
 Test Specification: Horizontal
 Comment: AC 120V/60Hz

M/N:SI494

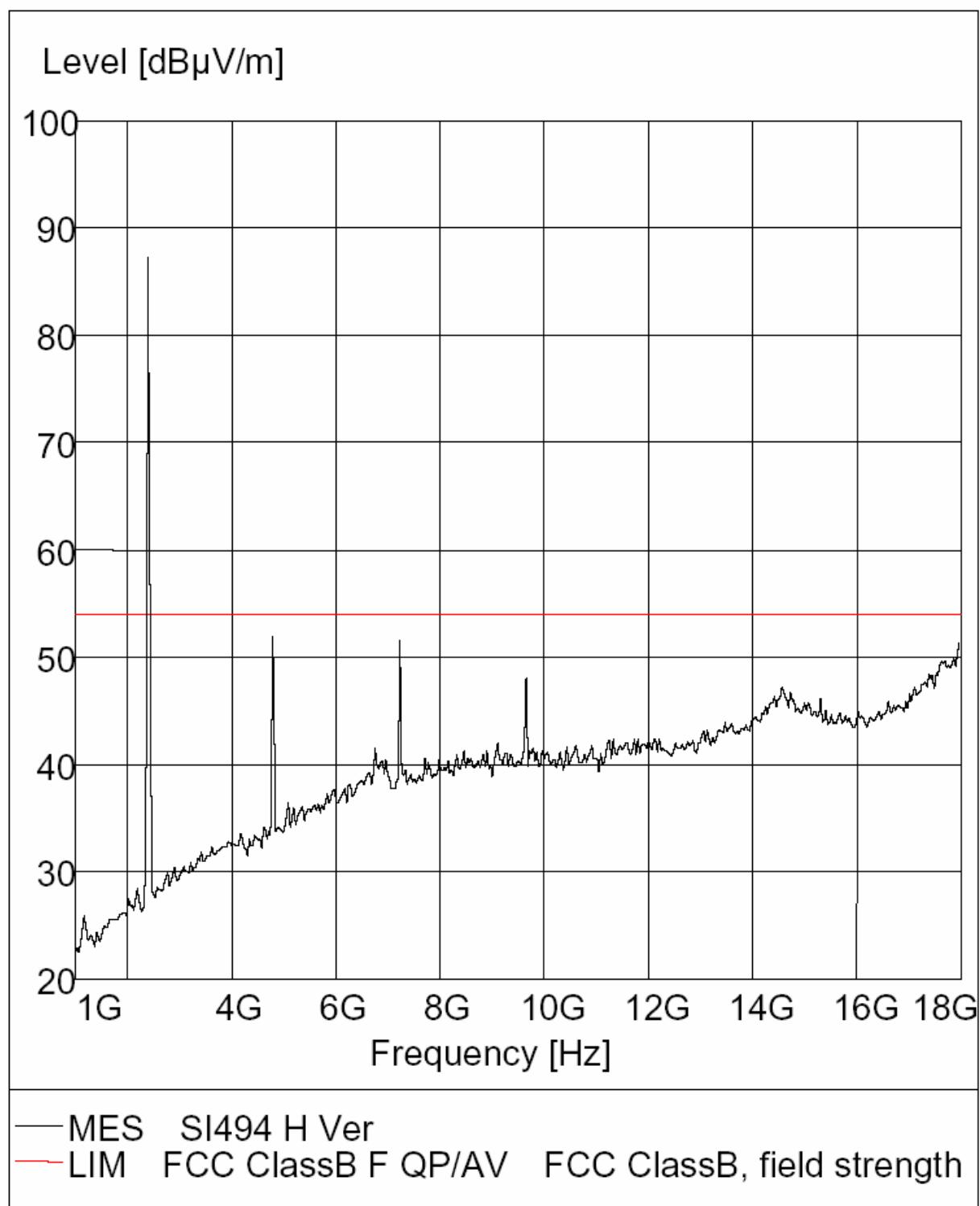


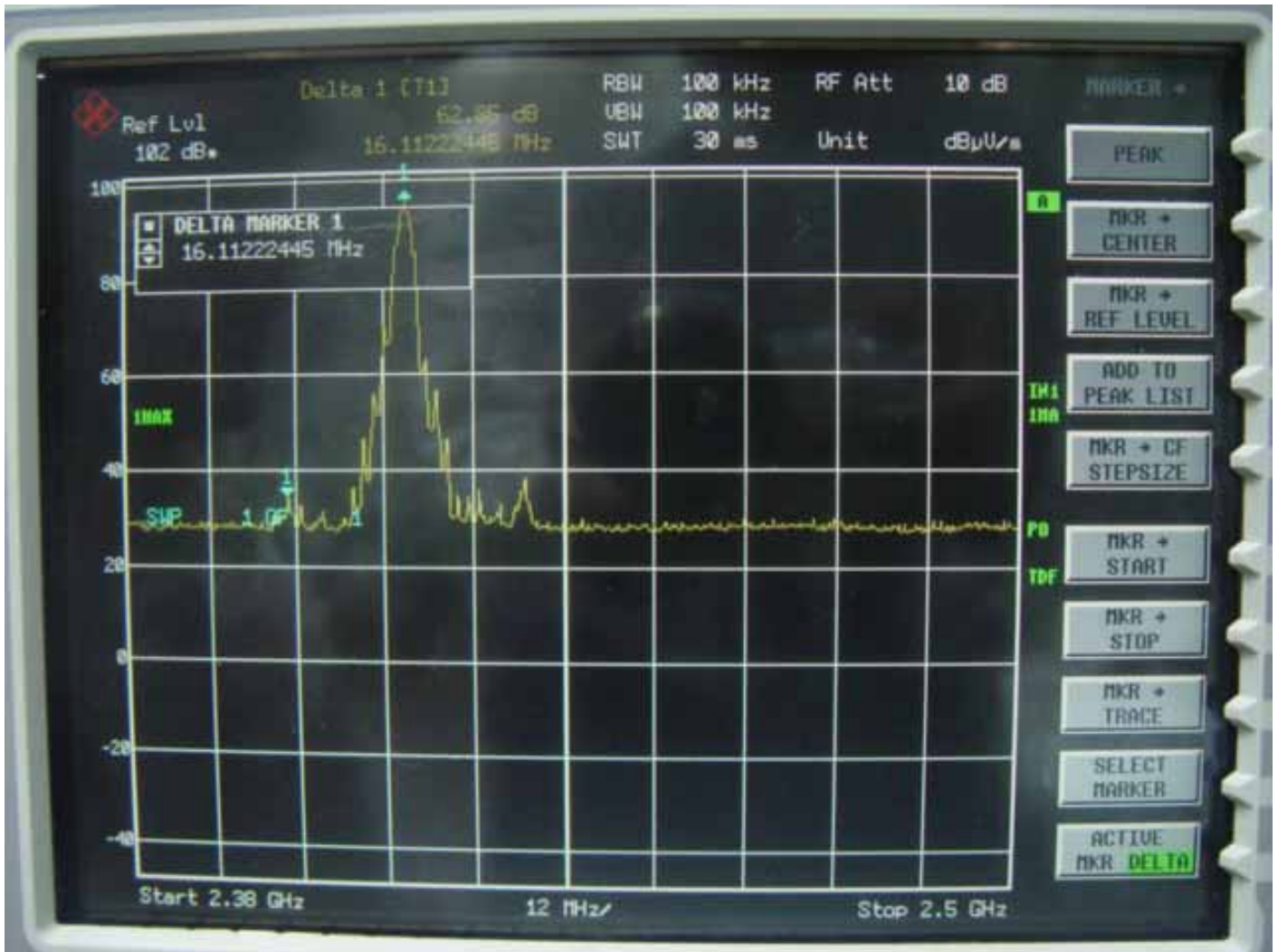
Radiated Disturbance

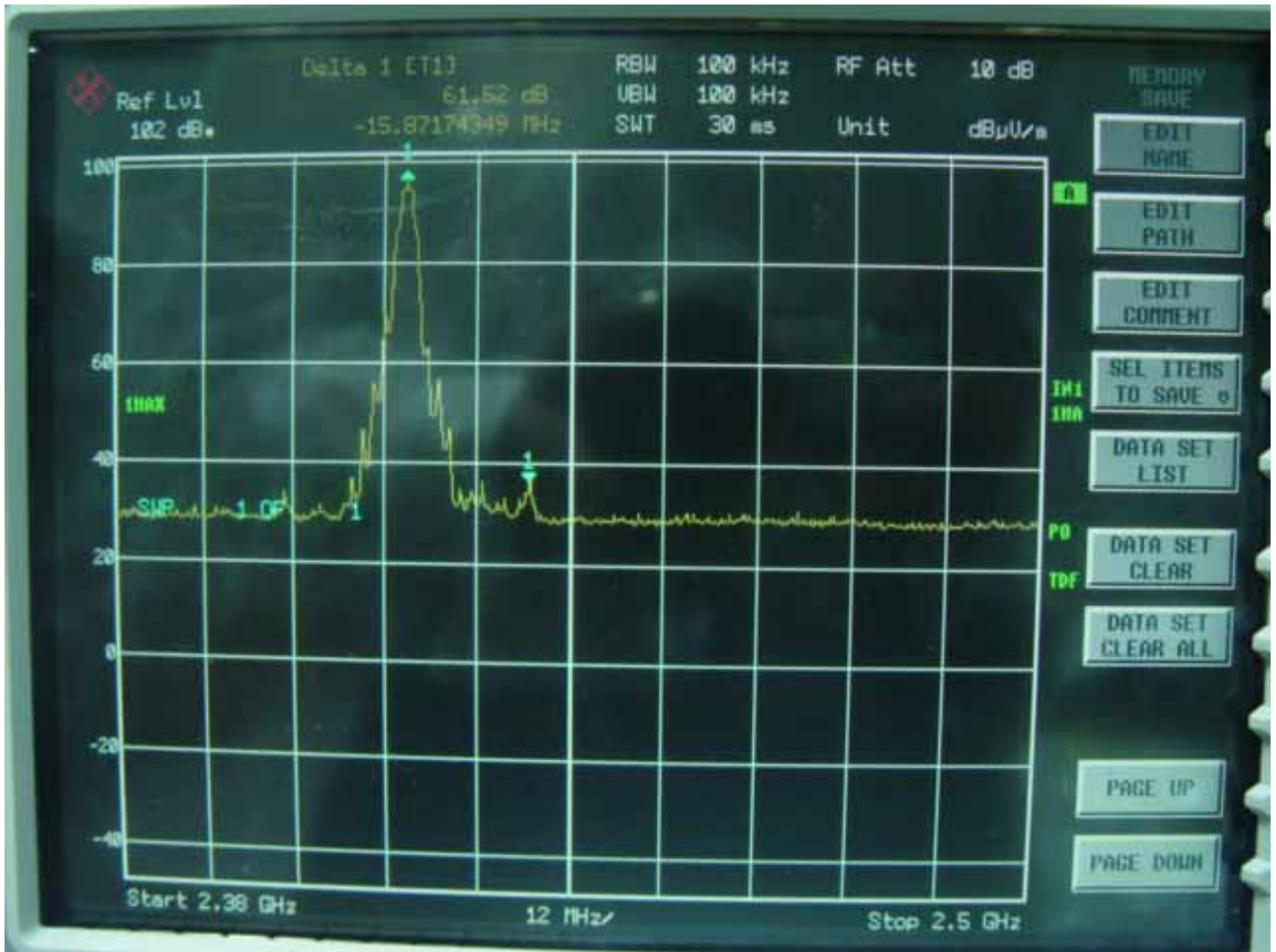
FCC Part15

EUT: Wireless stereo speaker system transmitter
Manufacturer: Mei Hua
Operating Condition: TX
Test Site: ATC EMC Lab.SAC
Operator: Jack
Test Specification: Vertical
Comment: AC 120V/60Hz

M/N:SI494







CONDUCTION EMISSION STANDARD FCC 15.207

28. Apr 05 09:49

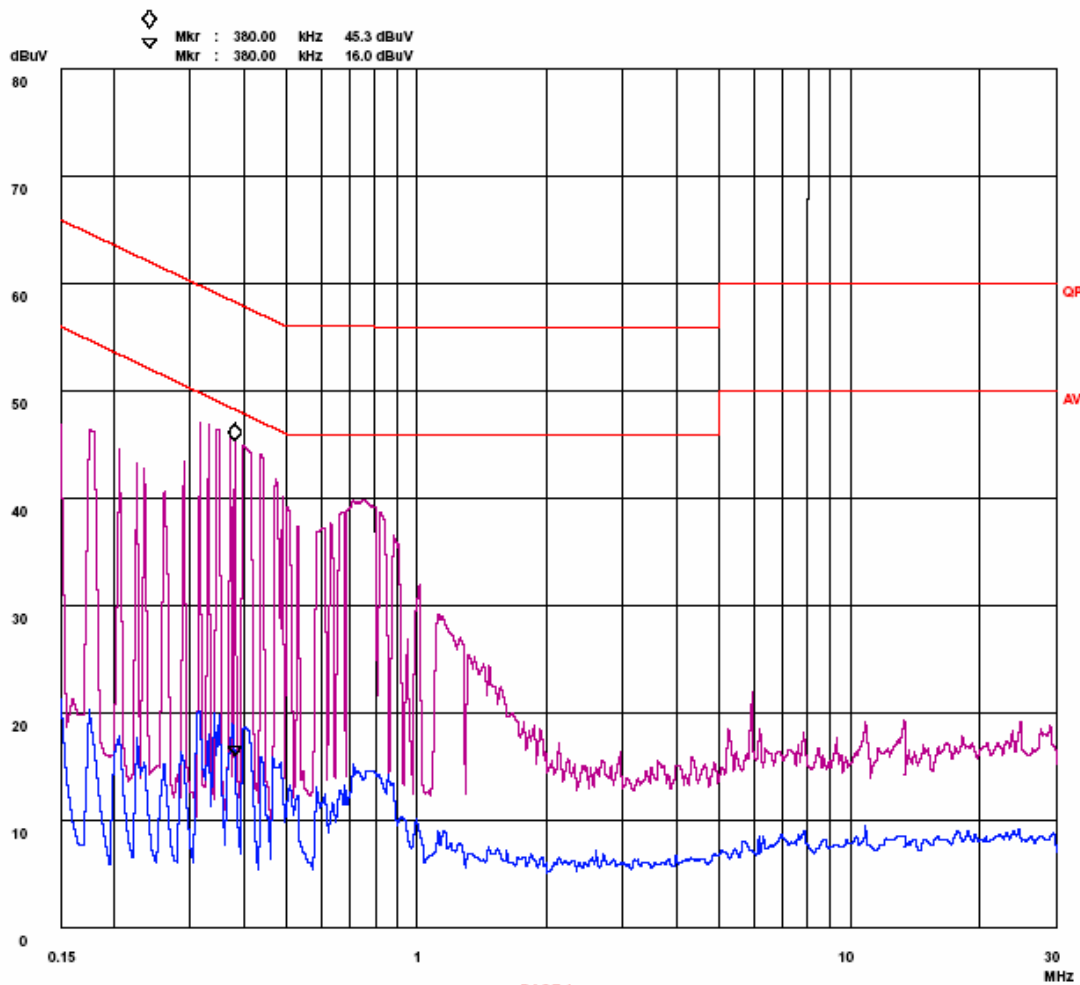
EUT: Wireless Stereo Speaker System Transmitter
Manuf: Mei Hua
Op Cond: TX With 1kHz Signal
Operator: Andy
Test Spec: Va 120V/60Hz
Comment: Tem22°C Hum150%
m/n:SI494

Scan Settings (3 Ranges)

Frequencies			Receiver Settings			
Start	Stop	Step	IF BW	Detector	M-Time	Atten Preamp
150k	2M	5k	9k	PK+CAV	1ms AUTO LN	OFF
2M	10M	10k	9k	PK+CAV	1ms AUTO LN	OFF
10M	30M	25k	9k	PK+CAV	1ms AUTO LN	OFF

Final Measurement: x QP / + CAV
Meas Time: 1 s

Transducer No. Start Stop Name
1 9k 30M confac



CONDUCTION EMISSION STANDARD FCC 15.207

28. Apr 05 09:53

EUT: Wireless Stereo Speaker System Transmitter
Manuf: Mei Hua
Op Cond: TX with 1kHz signal
Operator: Andy
Test Spec: Vb 120V/60Hz
Comment: Tem22°C Humi50%
m/n: S1494

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	2M	5k	9k	PK+CAV	1ms AUTO LN	OFF	
2M	10M	10k	9k	PK+CAV	1ms AUTO LN	OFF	
10M	30M	25k	9k	PK+CAV	1ms AUTO LN	OFF	

Final Measurement: x QP / + CAV

Meas Time: 1 s

Transducer No. Start Stop Name
1 9k 30M confac

